

Amending Moore's Law for Embedded Applications Panel Discussion

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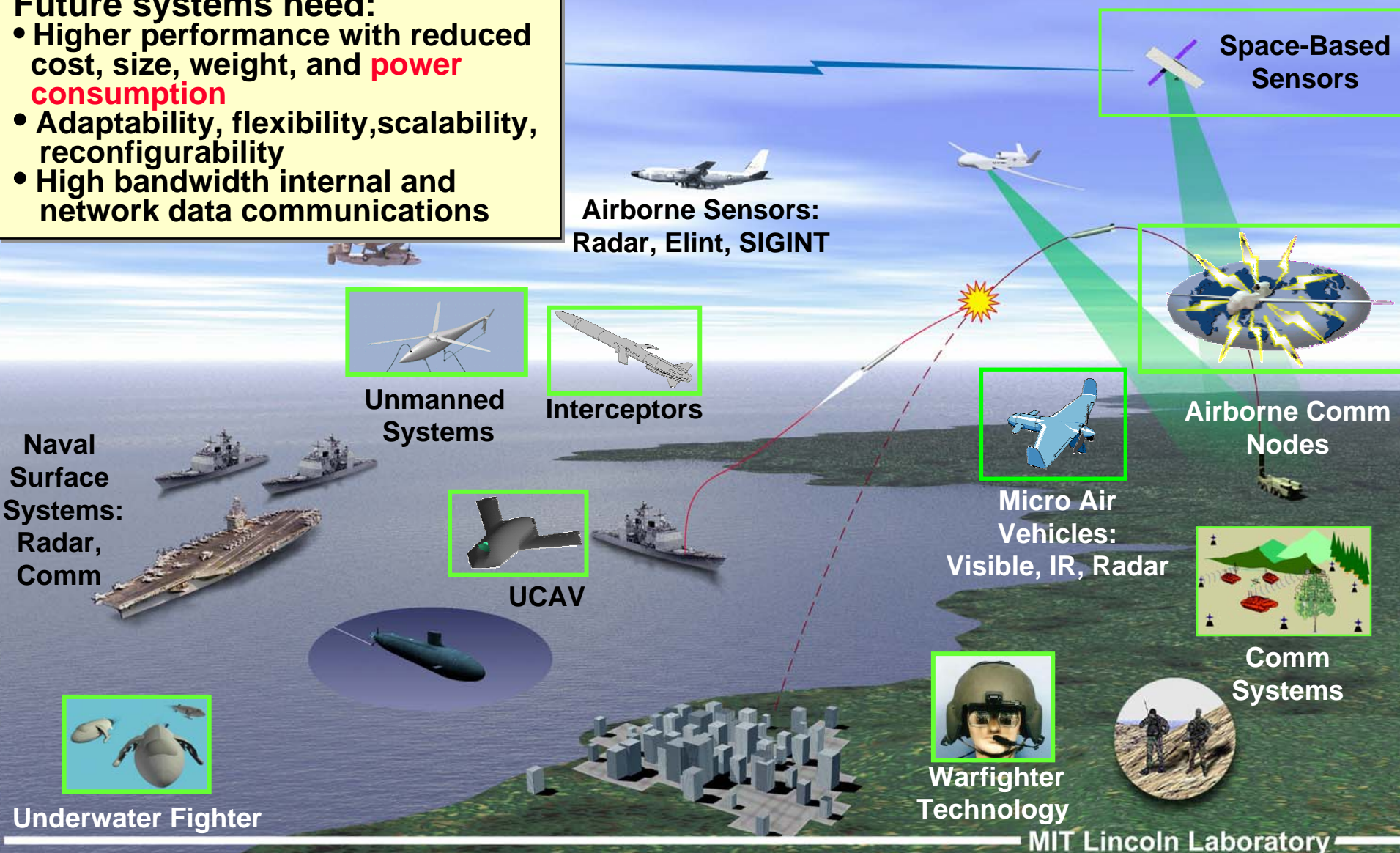
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DoD Embedded Processing Applications

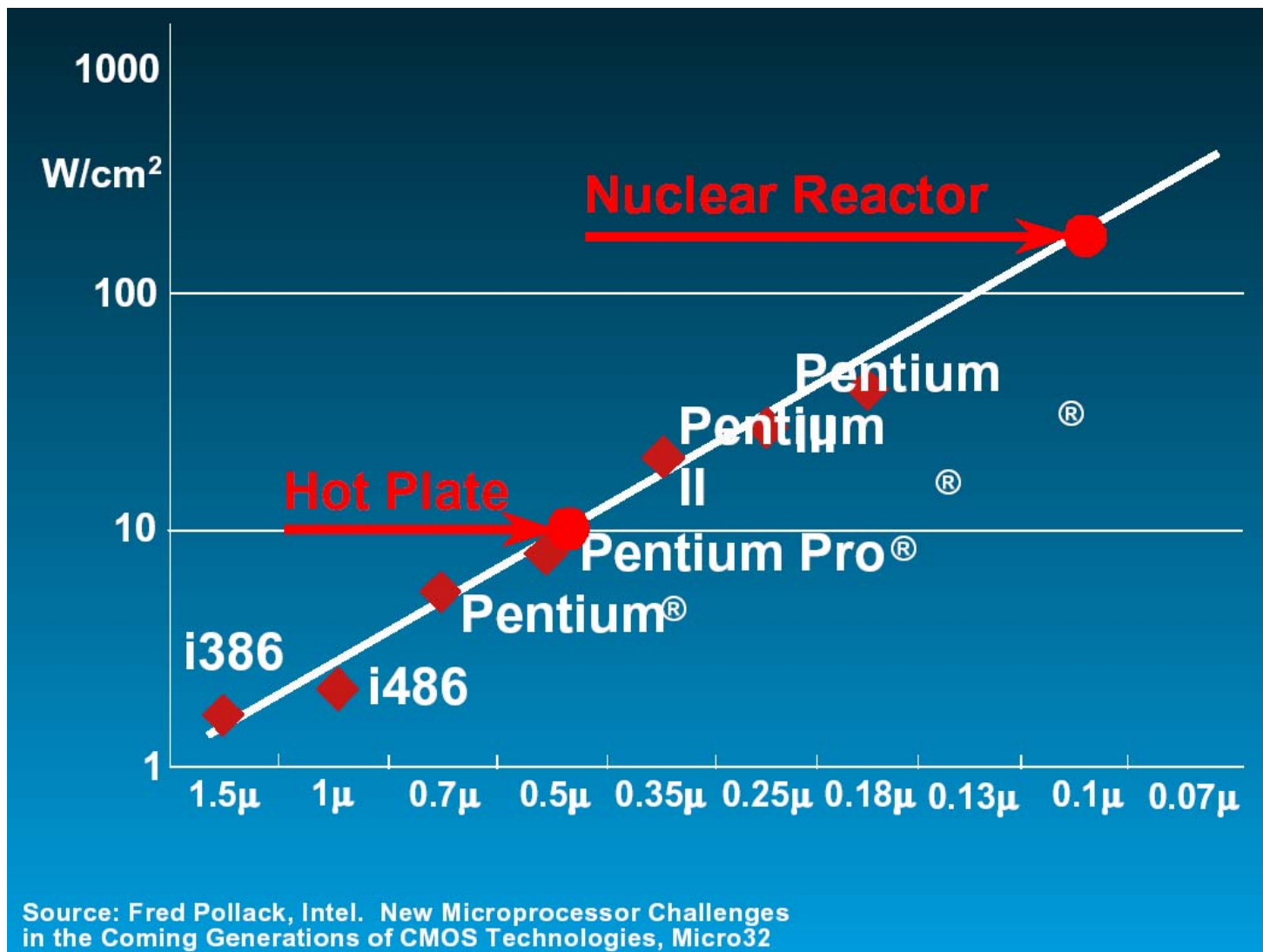
Future systems need:

- Higher performance with reduced cost, size, weight, and **power consumption**
- Adaptability, flexibility, scalability, reconfigurability
- High bandwidth internal and network data communications





Power Density: The Fundamental Problem





Prognosis For Moore's Law Benefits

Higher Speed?

Lower Cost?

Pentium 4 (90nm): ~80 W/cm²

Stovetop: ~10 W/cm²

Lower Power?

Past

Supply voltage (V) scales as 1/s

Capacitance (C) scales as 1/s

Energy per op scales as $CV^2 \propto 1/s^3$

⇒ Voltage scaling from 5V to 1V
accounts for 25X reduction in power,
just by itself

Future Issues

Only 2x voltage scaling planned
(1V now to ~0.5V in 2016)

⇒ Scaling energy per op is
critical to long endurance
battery powered systems and to
supercomputers (getting power
in and heat out)